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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/650,626	08/30/2000	Dennis C. Wilson	2394.02US02	1440

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EXAMINER
WEST, JEFFREY R

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No.	Applicant(s)	
	09/650,626	WILSON ET AL	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,15,18,20-23,25,26,28,29,32-48 and 51-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29 and 32-39* is/are allowed.

6)☒ Claim(s) *1-10,12,15,18,20-23,25,26,28,40-48 and 51-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim R j ctions - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-11, 23, 26, 28, 48, 49, 51, and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,754,451 to Williams in view of U.S. Patent No. 6,006,171 to Vines et al.

Williams discloses a computerized machine control monitoring system, wherein a CMC uses a control program to control the operation of a machine through a plurality of digital channels, that define a substantially complete machine (column 2, lines 54-61 and column 3, lines 4-9), comprising a data acquisition component that is in communication with the CMC and acquires transition data about the digital channels, an analysis component that is in communication with the data acquisition component and performs analysis on the acquired transition data to automatically determine if the machine has experienced a downtime event (column 3, lines 10-19) and, independent of the control program, develops a probability prioritized inventory of which channel likely caused the downtime event (column 5, lines 34-41), and a data storage component that is in communication with the data acquisition component to store the acquired transition data and establish a historical pattern of

transition data (column 3, lines 35-43). Williams also discloses comparing the dynamic historical pattern of transition data, chosen from a pre-selected library of dynamic historical patterns (column 5, lines 49-61), to the current transition data, independent of the control program, to determine the operational status of the machine (column 3, lines 44-54 and column 5, lines 18-24).

Williams discloses that the remote/stand alone monitoring device (column 3, lines 20-22) comprises a display device (column 3, lines 22-25), in communication with the data storage component, that displays a cycle count of the repeatably cyclic transition data (column 2, lines 1-9), the prioritized channel inventory ("94" in Figure 5), and the overall operational status of the machine (column 1, lines 49-58).

Williams also discloses that the analysis component performs analysis on the acquired transition data to automatically, and without user-input, determine, store, and display, whether the machine has experienced a downtime event (i.e. a machine fault) (column 1, lines 16-20 and column 5, lines 33-40) as well as if one of the digital channels intermittently experiences an unexpected transition absent a downtime event (column 5, lines 3-24) wherein the unexpected transition is characterized by a statistically significant deviation (column 5, lines 18-24)

Williams does not disclose, however, applying the diagnostic method for a plurality of virtual CMC machines that use different communication schemes to perform different functions, and displaying the corresponding operational status, identifier, and runtime, of the plurality of machines substantially simultaneously.

Vines teaches a dynamic maintenance management machine comprising a display that identifies each individual control channel with a inputted name (column 1, lines 61-64), for monitoring and analyzing control data obtained from sensors in communication with a plurality of computer controllers (column 3, lines 30-39) that control a plurality of different virtual machines (i.e. groups of process variables defining subsets of a larger machine) (column 1, lines 61-64, column 4, lines 4-14, and Figures 5 and 6), as well as displaying the current data and historical data for each individual channel substantially simultaneously (Figures 3, 4, and 7). Vines also teaches obtaining start-up data and time-stamped transition data measured from the pre-defined start of a runtime clock (column 5, lines 16-22) which is displayed on the monitor (Figures 3, 4, and 7). Further, it is considered inherent that the control computers use different communication schemes because they control a variety of different machines that would require different commands.

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams to include applying the diagnostic method for a plurality of virtual CMC machines that use different communication schemes to perform different functions, and displaying the corresponding operational status, identifier, and runtime, of the plurality of machines substantially simultaneously, as taught by Vines, because, as suggested by Vines, the combination would have provided the user with easily understandable data by clearly labeling the information as well as allowed the user to monitor the control communications of an entire system rather

than just one machine (column 1, lines 29-32) and define specific processes of high importance to be monitored (column 1, line 64 to column 2, line 3).

Further, although Williams teaches establishing a priority based on probability but does not disclose that the priority is established according to a calculated probability percentage, it would have been obvious to one having ordinary skill in the art to calculate the prioritized probability according to a percentage because percentages are the well-known method for expressing a probability.

3. Claims 12, 15, 18, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Vines and further in view of U.S. Patent No. 5,870,693 to Seng et al.

As noted above, the invention of Williams and Vines teaches many of the features of the claimed invention, including calculating a priority percentage based on a pre-selected historical reference data set (i.e. based upon the original and learned/historical states stored therein) (column 5, lines 34-41), but does not specify that when a downtime event occurs, priority is established according to a time sequence of acquired data based on proximity to the occurrence of the downtime event.

Seng teaches an apparatus and method for diagnosis of abnormality in processing equipment comprising production equipment that executes a plurality of steps of a sequence under the control of a PLC (column 4, lines 27-31), a display device that provides information relative to a downtime event (column 4, lines 44-

55), and a detecting means for determining the channel of data that likely caused the downtime event by analyzing the time sequenced proximity to the downtime event (column 9, lines 1-17 and 49-56).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Vines to include specifying that when a downtime even occurs, priority is established according to a time sequence of acquired data based on proximity to the occurrence of the downtime event, as taught by Seng, because, as suggested by Seng, the combination would have increased the production of the equipment by automatically diagnosing and determining the point of error in the machine using a logical sequential order rather than an expert system/analysis of the control program in the PLC therefore allowing abnormality detection by an average user (column 1, lines 42-48, column 2, lines 30-35 and column 11, lines 15-30).

4. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Vines and Seng and further in view of U.S. Patent No. 5,949,676 to Elsley.

As noted above, Williams in combination with Vines and Seng teaches many features of the claimed invention including indicating an unexpected transition as characterized by a statistically significant deviation (Williams, column 5, lines 18-24) but does not teach specifying that the performed analysis comprise statistical

standard deviation analysis and that a downtime event is defined by a statistically significant deviation in combination with an expired downtime timer.

Elsley teaches a method and system for diagnosing the behavior of a machine controlled by a discrete event control system comprising developing diagnostic rules based on discrete event timing patterns that occur during operation of the machine and evaluating the occurrence of the discrete events relative to the diagnostic rules to identify malfunctions in the behavior of the machine (column 2, lines 18-23). Elsley also teaches that the diagnostic rules are defined based on statistical analysis, such as standard deviation, of the repetitions of the machine timing pattern (column 2, lines 36-44) and that the occurrence of a downtime event is determined by a statistically significant deviation in combination with an expired downtime timer (column 9, line 60 to column 10, line 7)

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams, Vines, and Seng to include specifying that the performed analysis comprise statistical standard deviation analysis, as taught by Elsley, because, as suggested by Elsley, the combination would have provided a statistical analysis detection method, that can automatically adapt to changing operating conditions, which detects transient errors rather than only hard causal relationships (column 1, lines 25-32 and column 2, lines 4-15) and because standard deviation would have been a well-known method for measuring the deviation of Williams. Further, it would have been obvious to one having ordinary skill in the art to modify the invention of Williams, Vines, and Seng to include indicating a downtime event

based on an expired downtime timer because the combination would have provided a method for eliminating false alarms by indicating downtime only when a serious fault stops the operation of the machine rather when there is an occurrence of a non-detrimental fault caused by periodic deviation.

5. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Vines and further in view of U.S. Patent No. 5,949,676 to Elsley.

As noted above, the invention of Williams and Vines teaches many features of the claimed invention including indicating an unexpected transition as characterized by a statistically significant deviation (Williams, column 5, lines 18-24) but does not teach specifying that the performed analysis comprise statistical standard deviation analysis.

Elsley teaches a method and system for diagnosing the behavior of a machine controlled by a discrete event control system comprising developing diagnostic rules based on discrete event timing patterns that occur during operation of the machine and evaluating the occurrence of the discrete events relative to the diagnostic rules to identify malfunctions in the behavior of the machine (column 2, lines 18-23). Elsley also teaches that the diagnostic rules are defined based on statistical analysis, such as standard deviation, of the repetitions of the machine timing pattern (column 2, lines 36-44) and that the occurrence of a downtime event is determined

by a statistically significant deviation in combination with an expired downtime timer (column 9, line 60 to column 10, line 7).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Vines to include specifying that the performed analysis comprise statistical standard deviation analysis, as taught by Elsley, because, as suggested by Elsley, the combination would have provided a statistical analysis detection method, that can automatically adapt to changing operating conditions, which detects transient errors rather than only hard causal relationships (column 1, lines 25-32 and column 2, lines 4-15) and because standard deviation would have been a well-known method for measuring the deviation of Williams.

6. Claims 40-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Vines and further in view of U.S. Patent No. 5,586,156 to Gaubatz.

As noted above, the invention of Williams and Vines teaches many features of the claimed invention including obtaining predetermined limits of the cycle count, as well as the library of historical transition data, based on configurations in the hardware and software set by the manufacture (Williams, column 4, lines 22-24 and column 5, lines 49-54) as well as specifying that the historical pattern of transition data is obtained from a pre-determined reference data set that is repeatably cyclic, comprises at least one cycle of data, and defines a machine. The invention of Williams and Vines teaches these steps for transition data only, however, and not for

a sub-set of transition data (i.e. start-up data) that is controlled by the program and compared to expected historical data.

Gaubatz teaches an automatic self-testing and diagnostic system comprising discriminating against failed sensors by automatically entering a predetermined state when failures are detected through a comparison between current data and theoretical data (column 2, line 59 to column 3, line 2), measuring current start-up data, and comparing the measured start-up data to a predetermined set of reference data stored in the device software instructions (column 5, line 61 to column 6, line 2).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Vines to include performing the aforementioned analysis for a program-controlled sub-set of transition data (i.e. start-up data), rather than only transition data, as taught by Gaubatz, because, as suggested by Gaubatz, the combination would have provided safe and proper operation of the machinery by insuring that the crucial initial conditions of the machining process are met (column 6, lines 2-5 and 33-37).

7. Claims 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Vines and further in view of U.S. Patent No. 5,319,353 to Ohnishi et al.

As noted above, the invention of Williams and Vines teaches all the features of the claimed invention except for displaying the operational status of the machine using a color-coded stack light.

Ohnishi teaches a method of monitoring a test handing machine which is capable of displaying the occurrence, and position, of an error or other inadequacy (column 3, line 67 to column 4, line 5) using a display panel (column 4, lines 15-24) as well as a color-coded stack alarm light, attached to the housing of the machine, that displays the operational status of the machine (column 7, line 64 to column 8, line 2, and "45" in Figure 3).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Vines to include displaying the operational status of the machine using a color-coded stack light, as taught by Ohnishi, because the combination would have provided a fast, convenient method for instantly determining the occurrence of a fault.

Allowable Subject Matter

8. Claims 29-39 are considered allowable over the prior art because while the invention of Rockwell Software, "RSRules" does teach a reaction-time diagram of run-time data indicating the time-on of a current transition and a time to off of a current transition with respect to a tolerance level based on historical transition data, for each of a plurality of digital channels individually, none of the cited prior art teaches or suggests specifically a viewing component displaying a sequence diagram of a historical pattern of transition data defined by a first average, as defined by equation 2 of the specification, transition time to on, a second average

transition time to off, and a duration time of each of a plurality of channels on an individual bases and a sequence diagram of current transition data.

Response to Arguments

9. Applicant's arguments filed 27 March 2003 have been fully considered but they are not persuasive.

Applicant argues that the combination of Williams and Vines is improper because there is no motivation to combine the references since Vines "is not a monitoring system, not a control system, but is merely a **linking software**" and "[t]he main reference, i.e. Williams, U.S. Pat. No. 5,754,451, **does not require linking** of maintenance software with process control software." Applicant also argues that "Williams utilizes a direct interface from its maintenance computer/maintenance software into a process controller; no additional linking of the maintenance software to the process control is required, or even possible in view of the direct interface utilized by Williams."

The Examiner contends that while the invention of Williams does include a direct interface from the maintenance computer to the processing controller not requiring the inclusion of a linking interface, the data read from the process controller directly corresponds to the inputs and outputs issued by the programmable controller (column 5, lines 41-47) and therefore directly corresponds to the individual process variables themselves. Therefore, the invention of Vines would still provide an advantage being implemented in the invention of Williams to interface between the

process variable data and the maintenance computer in order to join the process control input and output data with the maintenance determination software, in order to allow the definition of a plurality of virtual groups and provide more detailed run-time data corresponding to each of the groups or individual channels.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rockwell Software, "Getting Results with RSRules" teaches a computerized machine control monitoring system comprising acquiring and storing data about a plurality of digital channels wherein the digital channels are grouped as virtual machines. Rockwell Software also teaches displaying a reaction-time diagram with user defined names for each of the digital channel/virtual machine groups of run-time data indicating the time-on of a current transition and a time to off of a current transition with respect to a tolerance level based on historical transition data.

U.S. Patent No. 6,539,339 to Berry et al. teaches a method and system for maintaining thread-relative metrics for trace data adjusted for thread switches comprising a profiling process that determines a current thread, retrieves a stored metric for the preceding event of the current thread, obtains a current metric, and computes a thread-relative elapsed metric as a difference between the current metric and the stored metric.

U.S. Patent No. 6,229,433 to Rye et al. teaches an appliance control method including a macro window display that shows the relationship between on and off times of a plurality of appliance digital channels.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
June 11, 2003

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
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